

IN THE CLAIMS

1. **(canceled)**
2. **(canceled)**
3. **(previously amended)** A method for measuring an indication of attributes of materials containing a fluid state, the method comprising the steps of:
 - a. providing a time-domain signal indicative of attributes of said materials in a single event measurement;
 - b. constructing a time-domain averaged data train from said signal, the averaging being performed over two or more time intervals Δ_i , wherein at least two of said two or more time intervals Δ_i are different; and
 - c. computing an indication of attributes of said materials from the time-domain averaged data train.
4. **(currently amended)** The method of claim 3 wherein the following expression is used to construct the time-domain averaged data train within a Δ_i time interval:

$$\cancel{S_{\Delta}(t) = \int_t^{t+\Delta} dt' S(t')/\Delta} \quad S_{\Delta_i} = \int_t^{t+\Delta_i} dt' S(t')/\Delta_i, \text{ where } S(t) \text{ is the provided time-domain signal.}$$

5. **(currently amended)** The method of claim 3, wherein ~~the interval Δ_i is variable and a~~ portion of the time-domain averaged data train is constructed at times

$$\cancel{t = t_0, t_0 + \Delta, t_0 + 2\Delta, \dots, t_0 + N\Delta} \quad \underline{t = t_0, t_0 + \Delta_i, t_0 + 2\Delta_i, \dots, t_0 + N\Delta_i.}$$

6. **(previously amended)** The method of claim 3, wherein the time-domain signal is an NMR echo train.
7. **(original)** The method of claim 6, wherein the step of computing an indication of attributes is performed using inversion of the constructed time-domain averaged data train into T_2 domain.
8. **(currently amended)** The method of claim 7, wherein the T_2 distribution is estimated using the following expression $\underline{S_{\Delta}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta/T_2)) + Noise}$

$$S_{\Delta_i}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta_i/T_2)) + \text{Noise}, \text{ where } \phi(T_2) \text{ is the porosity}$$

corresponding to the exponential decay time T_2 .

9. **(previously amended)** The method of claim 3 further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio (SNR) of the measurement.

10. **(canceled)**

11. **(canceled)**

12. **(previously amended)** A method for measuring an indication of attributes of materials containing a fluid state, comprising the steps of:

- a. providing an NMR echo-train indicative of attributes of materials along the borehole;
- b. constructing a single event time-domain averaged data train from said NMR echo train, the averaging being performed over two or more time intervals Δ_i , wherein at least two of said two or more time intervals Δ_i are different; and
- c. computing an indication of attributes of said materials from the time-domain averaged data train.

13. **(previously amended)** The method of claim 12 further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio (SNR) of the measurement.

14. **(currently amended)** The method of claim 12 wherein the following expression is used

to construct the time-domain averaged data train: $\text{Echo}_{\Delta}(t) = \frac{\int_t^{t+\Delta} dt' \text{Echo}(t')}{\Delta}$

$$\text{Echo}_{\Delta_i}(t) = \frac{\int_t^{t+\Delta_i} dt' \text{Echo}(t')}{\Delta_i}, \text{ where } \text{Echo}(t) \text{ is the provided time-domain signal over a}$$

time interval Δ_i .

15. **(currently amended)** The method of claim 12, wherein ~~the interval Δ_i is variable and a~~ portion of the time-domain averaged data train is constructed at times

$$\text{t} = t_0, t_0 + \Delta, t_0 + 2\Delta, \dots, t_0 + N\Delta. \quad \underline{t = t_0, t_0 + \Delta_i, t_0 + 2\Delta_i, \dots, t_0 + N\Delta_i.}$$

16. (original) The method of claim 15, wherein the step of computing an indication of attributes is performed using inversion of the constructed time-domain averaged data train into T_2 domain.

17. (currently amended) The method of claim 16, wherein the T_2 distribution is estimated using the following expression $Echo_{\Delta}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta/T_2)) + Noise$

$$Echo_{\Delta_i}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta_i/T_2)) + Noise, \text{ where } \phi(T_2) \text{ is the porosity}$$

corresponding to the exponential decay time T_2 .

18. (canceled)

19. (canceled)

20. (previously amended) A method for increasing the spatial resolution of NMR logging measurements, comprising the steps of:

- a. providing an NMR echo-train indicative of attributes of materials of interest; and
- b. constructing a single event time-domain averaged data train from said NMR echo train, the averaging being performed over two or more time intervals Δ_i , wherein at least two of said two or more time intervals Δ_i are different.

21. (previously amended) The method of claim 20 further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio (SNR) of the measurement.

22. (currently amended) The method of claim 20 wherein the following expression is used to construct the time-domain averaged data train: $Echo_{\Delta}(t) = \int_t^{t+\Delta} dt' Echo(t') / \Delta$

$$Echo_{\Delta_i}(t) = \int_t^{t+\Delta_i} dt' Echo(t') / \Delta_i, \text{ where } Echo(t) \text{ is the provided time-domain signal.}$$

23. (currently amended) The method of claim 20, wherein ~~the interval Δ_i is variable and a~~ portion of the time-domain averaged data train is constructed at times

$$t = t_0, t_0 + \Delta, t_0 + 2\Delta, \dots, t_0 + N\Delta. \quad t = t_0, t_0 + \Delta_i, t_0 + 2\Delta_i, \dots, t_0 + N\Delta_i.$$

24. (original) The method of claim 23, wherein the step of computing an indication of attributes is performed using inversion of the constructed time-domain averaged data train into T_2 domain.

25. (currently amended) The method of claim 24 wherein the T_2 distribution is estimated using the following expression $Echo_{\Delta}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta/T_2)) + Noise$
 $Echo_{\Delta_i}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta_i/T_2)) + Noise$, where $\phi(T_2)$ is the porosity corresponding to the exponential decay time T_2 .

26. (previously amended) A method for real-time processing of NMR logging signals, comprising the steps of:

- a. providing real-time data corresponding to a single-event NMR echo train indicative of physical properties of materials of interest;
- b. constructing a time-domain averaged data train from said NMR echo train, the averaging being performed over variable time interval Δ using the expression

$$S_{\Delta}(t) = \int_t^{t+\Delta} dt' S(t') / \Delta, \text{ where } S(t) \text{ is the provided measurement signal, and the time-}$$

domain averaged data train is constructed at times $t = t_0, t_0 + \Delta, t_0 + 2\Delta, \dots, t_0 + N\Delta$; and

- c. computing in real time an indication of the physical properties of said materials based on the constructed time-domain averaged data train.

27. (original) The method of claim 26, further comprising the step of: inverting of the constructed time-domain averaged data train into the T_2 domain, wherein the T_2 distribution is modeled using the expression

$$Echo_{\Delta}(t) = \sum_{T_2} \phi(T_2) \exp(-t/T_2) (1 - \exp(-\Delta/T_2)) + Noise, \text{ where } \phi(T_2) \text{ is the porosity}$$

corresponding to the exponential decay time T_2 .

28. (original) The method of claim 26, further comprising the step of averaging two or more constructed time-domain averaged data trains to increase the signal-to-noise ratio (SNR) of the measurement.